



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/092,887

03/07/2002

George R. Brandes

ATMI-172-CIP-DIV

2808

25559

7590

09/02/2004

ATMI, INC.

7 COMMERCE DRIVE

DANBURY, CT 06810

EXAMINER

WILSON, SCOTT R

ART UNIT

PAPER NUMBER

2826

DATE MAILED: 09/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/092,887

Applicant(s)

BRANDES ET AL.

Examiner

Scott R. Wilson

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 21 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1 and 24-45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 24-45 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 March 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 43-45 are rejected under 35 U.S.C. 102(a) as being anticipated by Kortright et al.. As to claim 1, Kortright et al., discloses in paragraph three of the Introduction, an article comprising an amorphous silicon carbide film on a substrate transmissive to light, embodied as a figured glass substrate. Such a substrate would also necessarily be transmissive to infrared radiation, i.e. it could be radiantly heated from one side, and the temperature of the other side would increase.

As to claims 43 and 44, Kortright et al. discloses that the article is formed by magnetron sputtering, which is also known in the art to be synonymous with reactive magnetron sputtering, and reactive sputtering. For example, see Wahab et al., Abstract.

As to claim 45, the amorphous silicon carbide coating of Kortright et al. has high reflectivity in the extreme ultraviolet (EUV) region, and may therefore be considered to be a protective coating, which would block the transmission of EUV radiation.

Claims 1 and 43 are rejected under 35 U.S.C. 102(b) as being anticipated by Tomonari et al.. As to claim 1, Tomonari et al., Figure 21, discloses an article comprising an amorphous silicon carbide thin film (14H2)(col. 9, lines 18-19) on a substrate (14H1) which, along with layers (14H2) and (14H3), is part of an infrared detector (col. 9, lines 22-23), and is therefore necessarily transmissive to infrared radiation.

As to claim 43, Tomonari et al. discloses the deposition of the amorphous silicon carbide layer (14H2) by plasma enhanced chemical vapor deposition (col. 9, lines 37-40).

Art Unit: 2826

Claims 34-37 are rejected under 35 U.S.C. 102(b) as being anticipated by Pankove. As to claim 34, Pankove discloses (Abstract) a layer of amorphous silicon carbide formed on a photovoltaic device, which may be considered to be a light sensor. Applicant is free to amend claim 34 to recite "thin film in direct contact with at least part of the sensor", or the like. The language "thin film on at least part of the sensor" does not preclude there being additional layers between the thin film and sensor.

As to claims 35, 36 and 37, Pankove discloses (col. 2, line 54) that the amorphous silicon carbide film is 0.5  $\mu\text{m}$  thick.

Claim 38 is rejected under 35 U.S.C. 102(a) as being anticipated by Nagai et al.. Nagai et al. discloses an amorphous silicon carbide film embodied as a thermistor which is operable up to 350°C (page 359, line 3), which is within the scope of being operable up to 1000°C. The temperature 350 °C of Nagai et al. is within the scope of the limitation "about 350°C".

Claim 38 is further rejected under 35 U.S.C. 102(b) as being anticipated by Truher et al.. Truher et al. discloses a device which may comprise a doped amorphous silicon carbide sensor which is operable up to 730°C (col. 2, lines 64-66 and col. 3, line 2), which is within the scope of being operable from about 350°C to 1000°C.

Claim 39 is rejected under 35 U.S.C. 102(b) as being anticipated by Truher et al.. Truher et al. discloses a device which may comprise a doped amorphous silicon carbide sensor which is operable up to 730°C (col. 2, lines 64-66 and col. 3, line 2), which is within the scope of being operable up to 1000°C. The temperature 730°C of Truher et al. is within the scope of the limitation "about 730°C".

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2826

Claims 24 to 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bang in view of Rohm and Haas. As to claim 24, Bang discloses prior art comprising a shield of a thin film encapsulating an integrated circuit wafer chip and connection lines, which provides shielding against electromagnetic interference (col. 2, lines 10-14). Bang does not disclose expressly said thin film comprising amorphous silicon carbide. Rohm and Haas discloses an electrically conductive thin film of amorphous silicon carbide (CVD Silicon Carbide®) which may be formed on a generic structure. In addition, Rohm and Haas also discloses that the amorphous silicon carbide film can withstand temperatures as high as 1500°C. At the time of invention, it would have been obvious to a person of ordinary skill in the art to form a thin film of amorphous silicon carbide on a prior art device referred to in Bang. The motivation for doing so would have been to prevent corrosion, as noted in applicants discussion of prior art on page 3 of the specification, or to better protect against wear or corrosion (CVD Silicon Carbide® data sheet), as well as to conduct incident electromagnetic fields to ground, all at temperatures as high as 1500°C. Therefore, it would have been obvious to combine Rohm and Haas with Bang to obtain the invention as specified in claim 24.

As to claim 25, the low resistivity grade silicon carbide of Rohm and Haas would offer sufficient conductivity to conduct electromagnetic currents to ground, but retain optical transparency.

As to claim 26, Rohm and Haas discloses in the plot of resistivity versus temperature, that the electrical resistivity around 500°C is in the range of 0.01  $\Omega\text{cm}$  to 0.025  $\Omega\text{cm}$ .

As to claim 27, the product of Rohm and Haas, CVD Silicon Carbide®, is deposited by chemical vapor deposition.

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bang in view of Rohm and Haas and further in view of Wahab et al.. Bang in view of Rohm and Haas discloses the invention of claim 24, as described above. Bang in view of Rohm and Haas does not disclose expressly said thin film formed by sputtering. Wahab et al. discloses silicon carbide thin films formed by reactive magnetron sputtering at about 850°C. At the time of invention, it would have been obvious to a person of ordinary skill in the art to form a thin film of amorphous silicon carbide on a prior art device referred to in Bang by reactive magnetron sputtering. The motivation for doing so would have been to provide an even lower

Art Unit: 2826

conductivity film, since at 850°C, the conductivity is closer to the range of from 0.01  $\Omega\text{cm}$  to 0.025  $\Omega\text{cm}$  (Rohm and Haas plot of resistivity versus temperature). Therefore, it would have been obvious to form the device of Rohm and Haas and Bang by the sputtering method of Wahab et al. to obtain the device of claim 28.

Claims 29, 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bang in view of Rohm and Haas and further in view of Pankove. Bang in view of Rohm and Haas discloses the invention of claim 24, as described above. Bang in view of Rohm and Haas does not disclose expressly the thickness of the silicon carbide film. Pankove discloses a device comprising an amorphous silicon carbide film formed on an amorphous silicon substrate, which is 0.5  $\mu\text{m}$  thick. At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the thin film of Bang in view of Rohm and Haas to be about 0.5  $\mu\text{m}$  thick. The motivation for doing so would have been to form a device with the desired conductivity and optical transparency as well as thickness compatible with known manufacturing techniques, such as those disclosed by Pankove. Therefore, it would have been obvious to form the device of Rohm and Haas and Bang with the thickness disclosed by Pankove to form the devices of claims 29, 30 and 31.

Claims 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bang in view of Rohm and Haas and further in view of Meyers et al.. As to claim 32, Bang in view of Rohm and Haas discloses the invention of claim 24, as described above. Bang in view of Rohm and Haas does not disclose expressly a "glue layer" between the structure and the thin film. Meyers et al. discloses a silicon dioxide layer formed between a metal or glass substrate and a silicon carbide layer in order to provide adhesion (col. 4, lines 31-34). At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the thin film of Bang in view of Rohm and Haas with the adhesive layer of Meyers et al.. The motivation for doing so would have been to provide a mechanically durable thin film layer. Therefore, it would have been obvious to form the device of Rohm and Haas and Bang with the adhesive layer of Meyers et al. to form the device of claim 32.

As to claim 33, the adhesive layer of Meyers et al. is comprised of silicon dioxide.

**Conclusion**

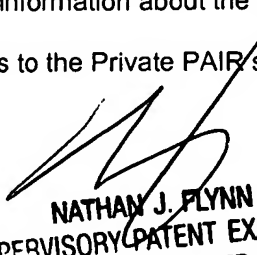
Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott R. Wilson whose telephone number is 571-272-1925. The examiner can normally be reached on M-F 8:30 - 4:30 Eastern.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
NATHAN J. FLYNN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800

srw  
August 12, 2004